

We claim:-

1. A process for continuous production of crosslinked fine particles of polymer gel by copolymerizing
  - 5 a) water-soluble monoethylenically unsaturated monomers,
  - 10 b) from 0.001 to 5 mol% based on the monomers (a) of monomers containing at least two ethylenically unsaturated double bonds, and
  - 15 c) from 0 to 20 mol% based on the monomers (a) of water-insoluble monoethylenically unsaturated monomers in from 20 to 80% by weight aqueous solution in the presence of an initiator at from 0 to 140°C by feeding the aqueous solution of the monomers together with the initiator and an inert gas continuously into a mixing kneader having at least two axially parallel rotating shafts equipped with a plurality of kneading and transporting elements which convey the substances introduced at the upstream end of the mixing kneader in the axial direction toward the downstream end of the mixer, which comprises the fraction of heat being removed by evaporation of water from the reaction mixture being not less than 5% of the heat of reaction and the fraction of heat being removed by product discharge being not less than 25% of the heat of reaction and the rest of the heat being removed via cooling of the reactor walls.
2. A process as claimed in claim 1, wherein in total not less than 50% of the heat of reaction is removed by product discharge and water evaporation.
3. A process as claimed in claim 1 or 2, wherein the mass throughput in terms of monomer solution is not less than 1000 kg/hm<sup>3</sup> and the inert gas flow is not less than 100 l/hm<sup>3</sup>.
4. A process as claimed in any of claims 1 to 3, wherein the monomers a) are selected from the group consisting of acrylic acid, methacrylic acid, the alkali metal and ammonium salts of these acids, acrylamide and methacrylamide.
- 45 5. A process as claimed in any of claims 1 to 4, wherein the reactor volume is not less than 0.10 m<sup>3</sup>.

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6. A process as claimed in any of claims 1 to 5, wherein the shafts of the mixing kneader contrarotate.
7. A process as claimed in any of claims 1 to 6, wherein the maximum temperature in the reactor is not less than 70°C, the exit gas temperature is not less than 60°C and the product temperature at the point of discharge from the reactor is not less than 60°C.
- 10 8. A process as claimed in any of claims 1 to 7, wherein the inert gas used is nitrogen, a noble gas, carbon monoxide, carbon dioxide, sulfur hexafluoride or a mixture thereof.
9. A process as claimed in any of claims 1 to 8, wherein the inert gas is wholly or partly generated by a chemical reaction in the mixing kneader.

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